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Huang

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(54) **DISASSEMBLING TOOL**

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(52) **U.S. Cl.**
CPC ***B25B 27/062*** (2013.01)

(58) **Field of Classification Search**
CPC B25B 27/062
USPC 29/263
See application file for complete search history.

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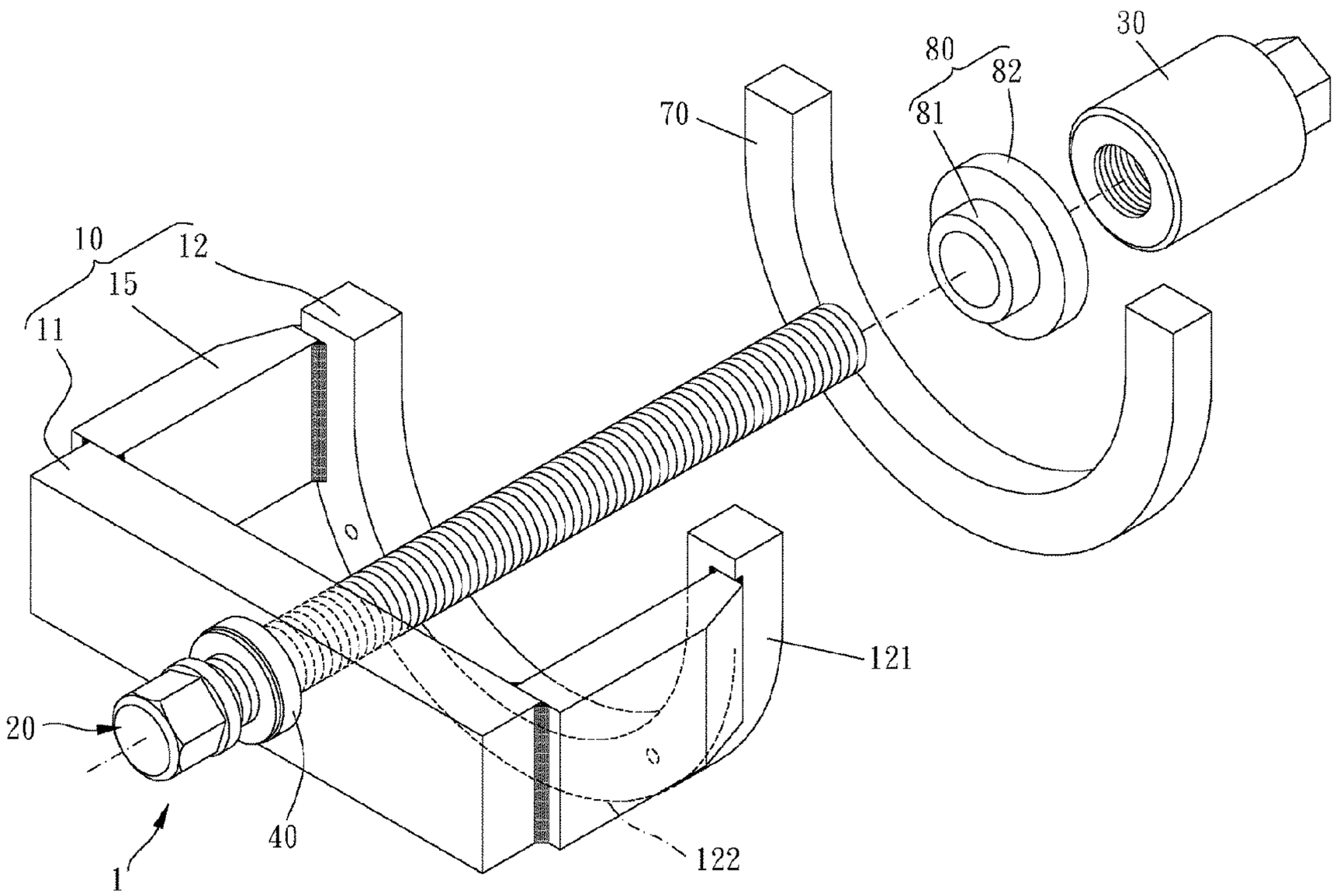
(57) **ABSTRACT**

A disassembling tool is provided, including: a main body, a screw rod, a screw barrel and a bearing. The main body includes a first end portion, a second end portion and a receiving space. The first end portion includes a through hole. The screw rod penetrates through the through hole. The screw barrel is screwed on the screw rod. The bearing is sleeved to the screw rod and includes an inner ring, an outer ring and a plurality of rollers. The inner ring includes a first base board and a first annular portion which are transversely connected with each other, and the outer ring includes a second base board and a second annular portion which are transversely connected with each other. The plurality of rollers are abutted against and between the first and second base boards and between the first and second ring portions.

8 Claims, 8 Drawing Sheets



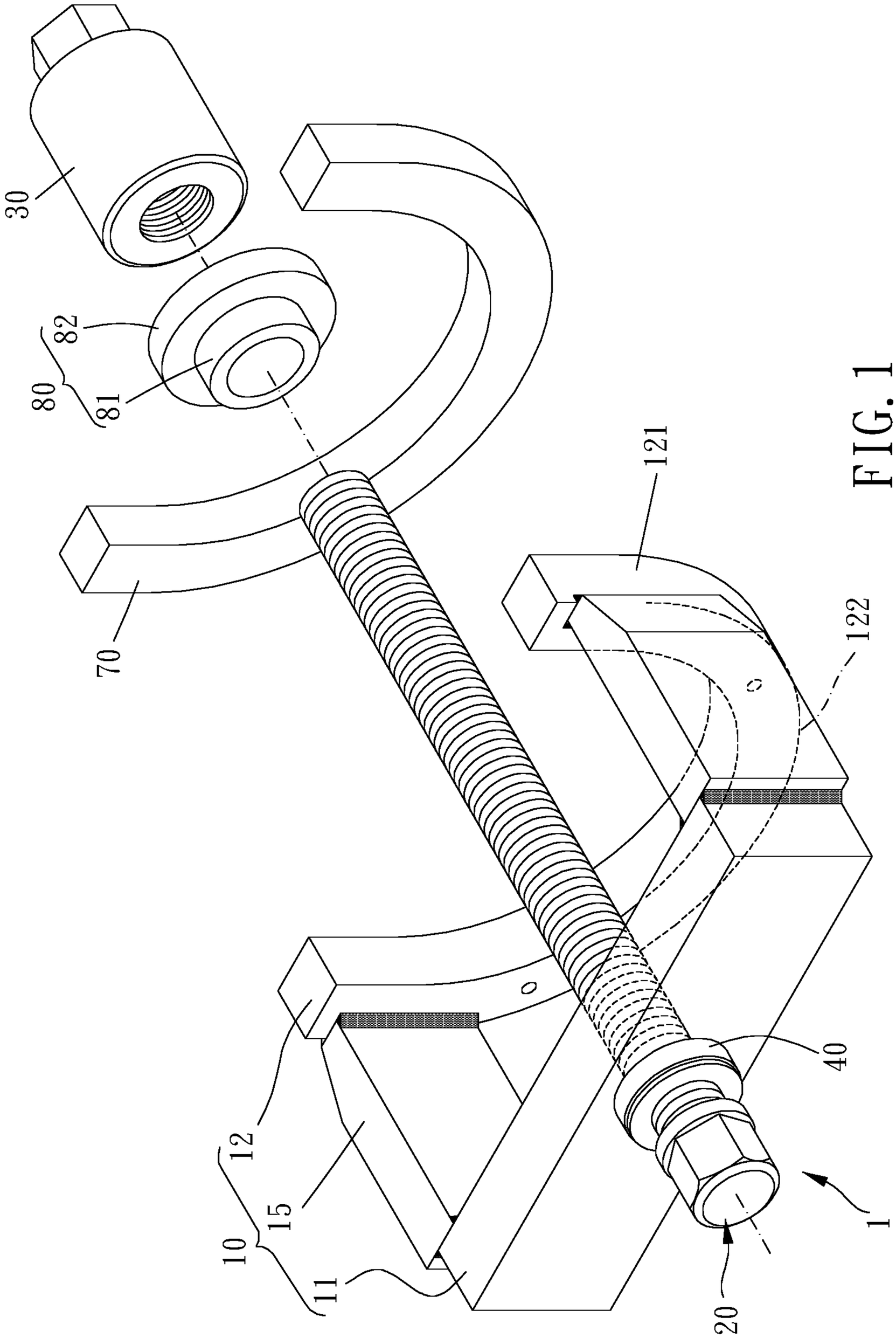


FIG. 1

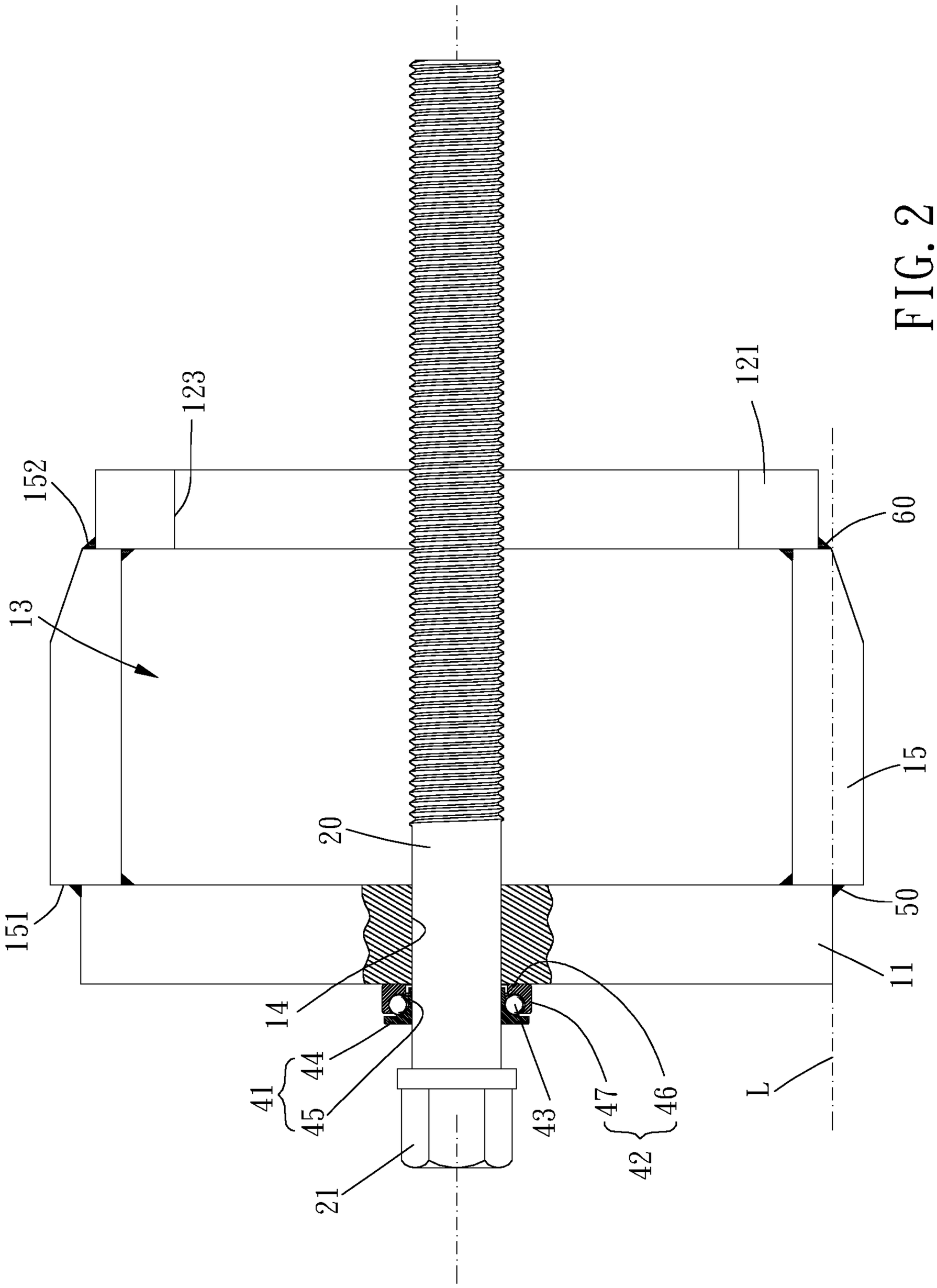


FIG. 2

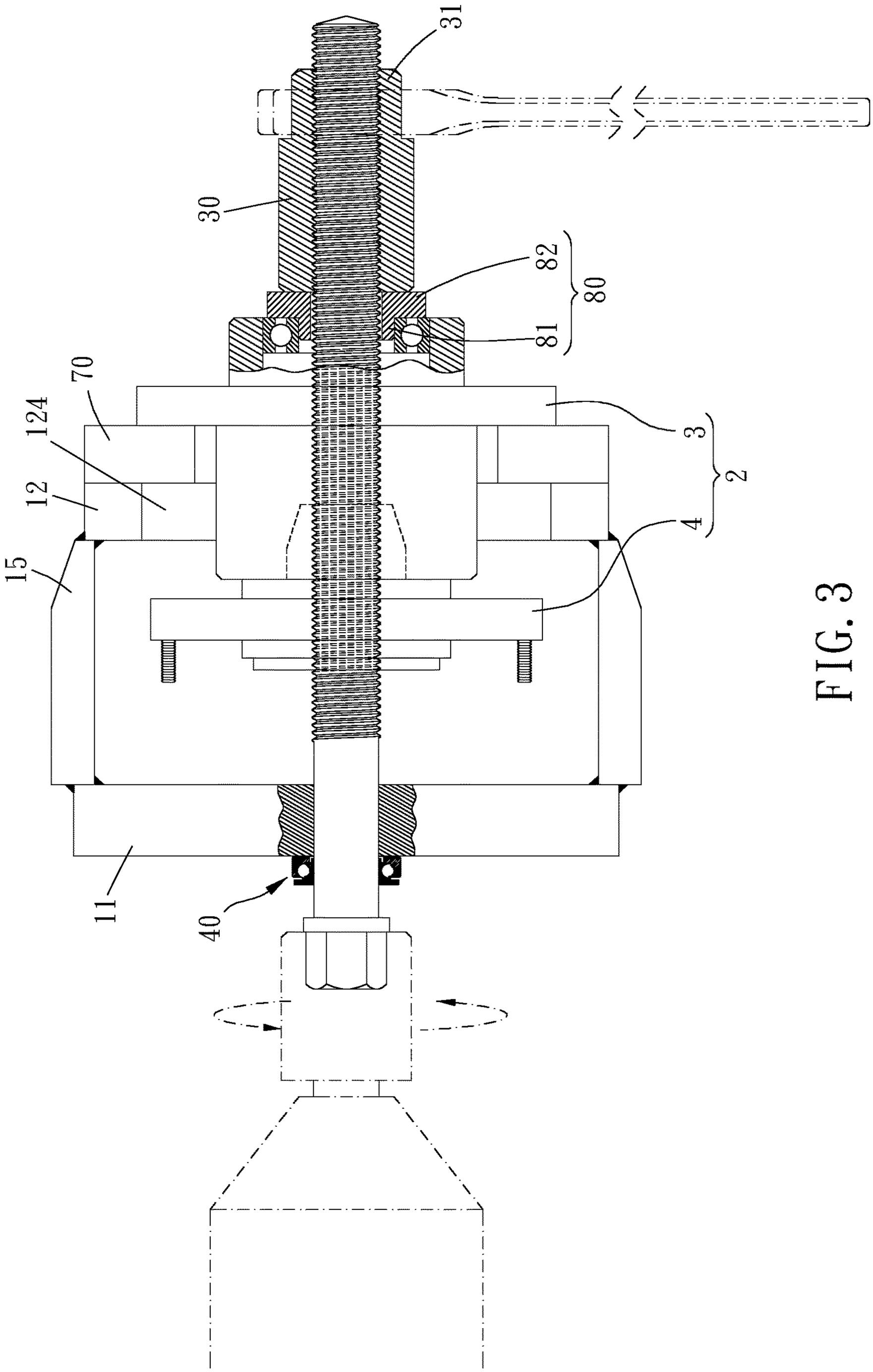


FIG. 3

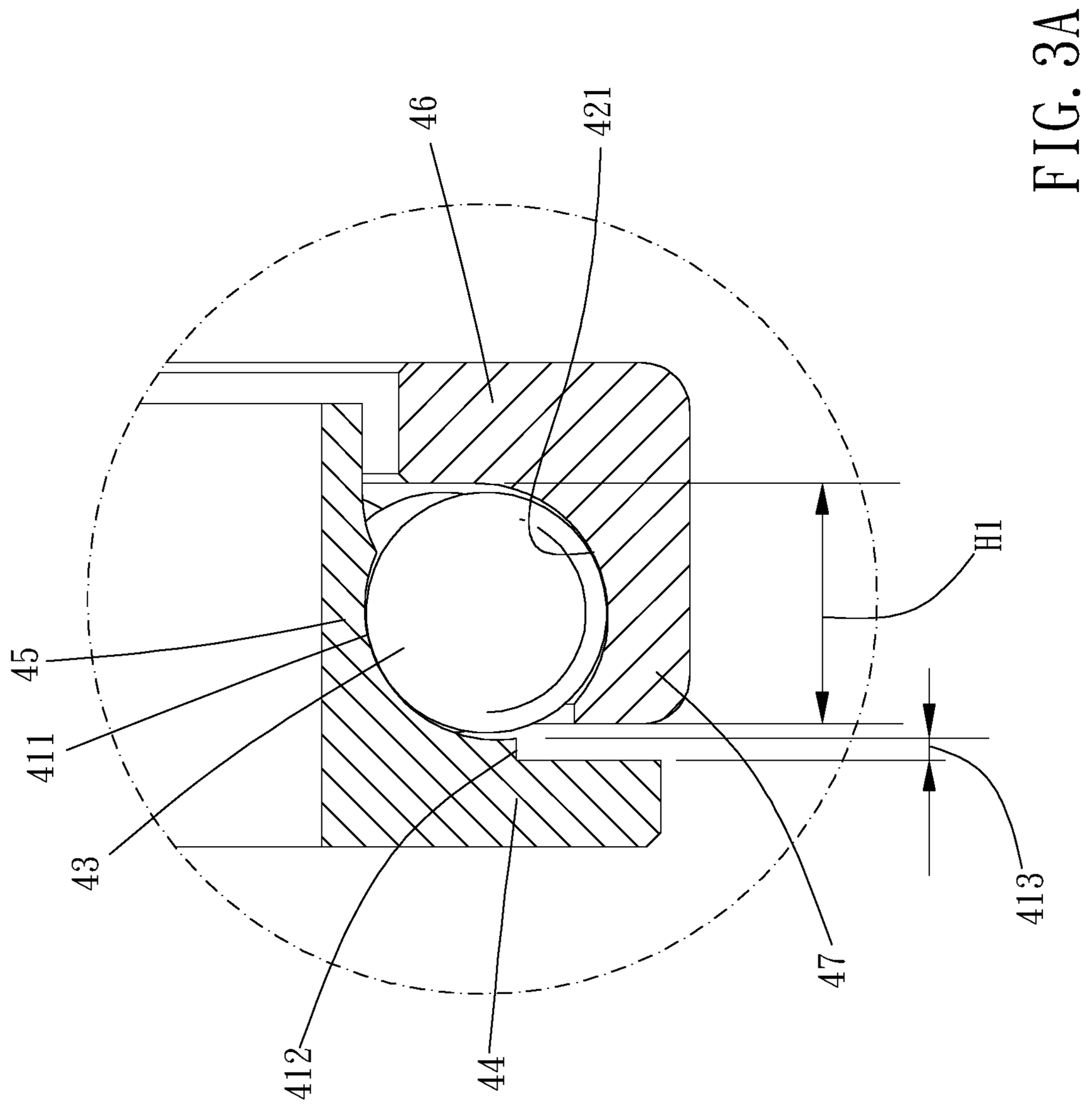


FIG. 3A

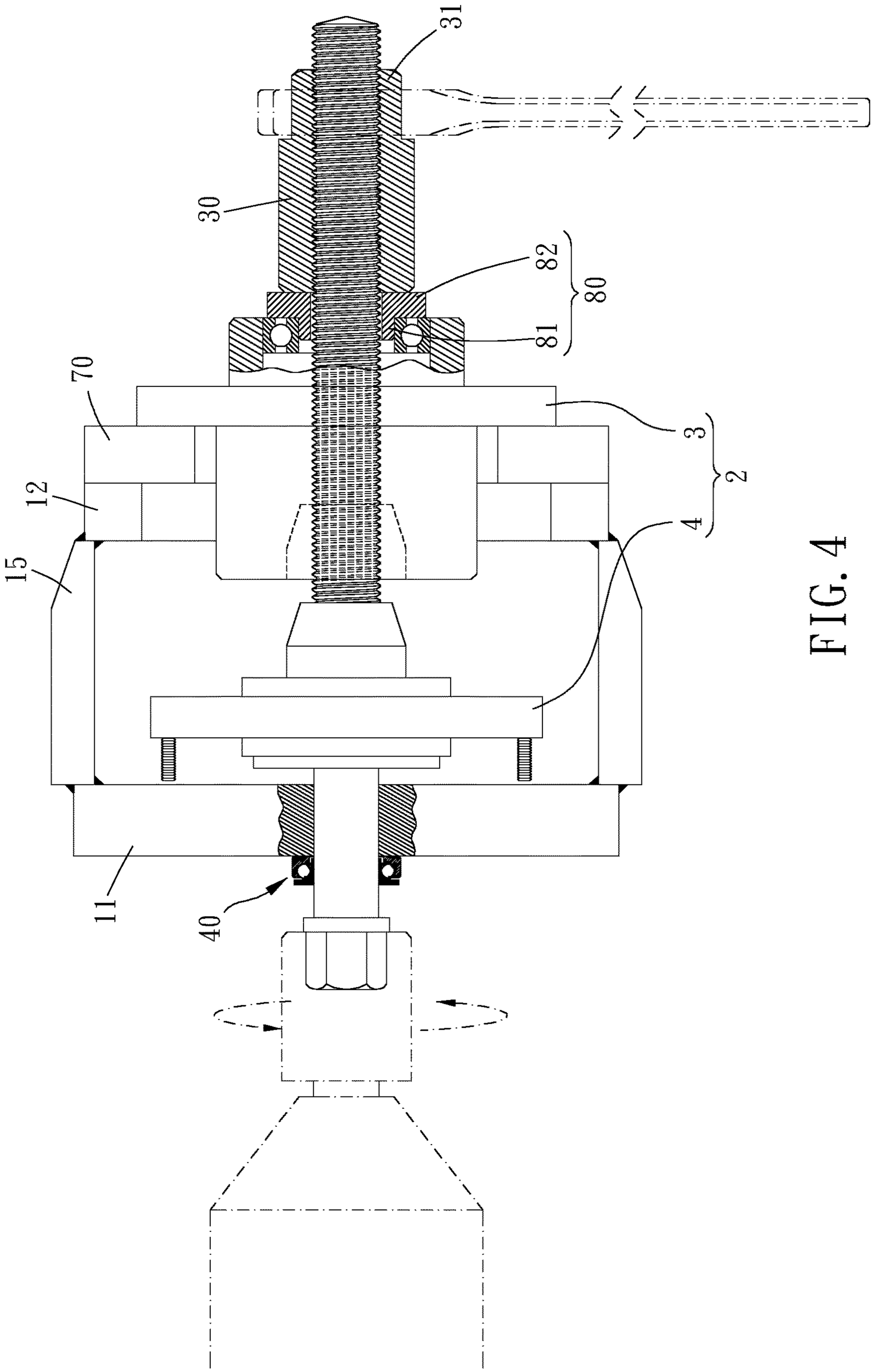


FIG. 4

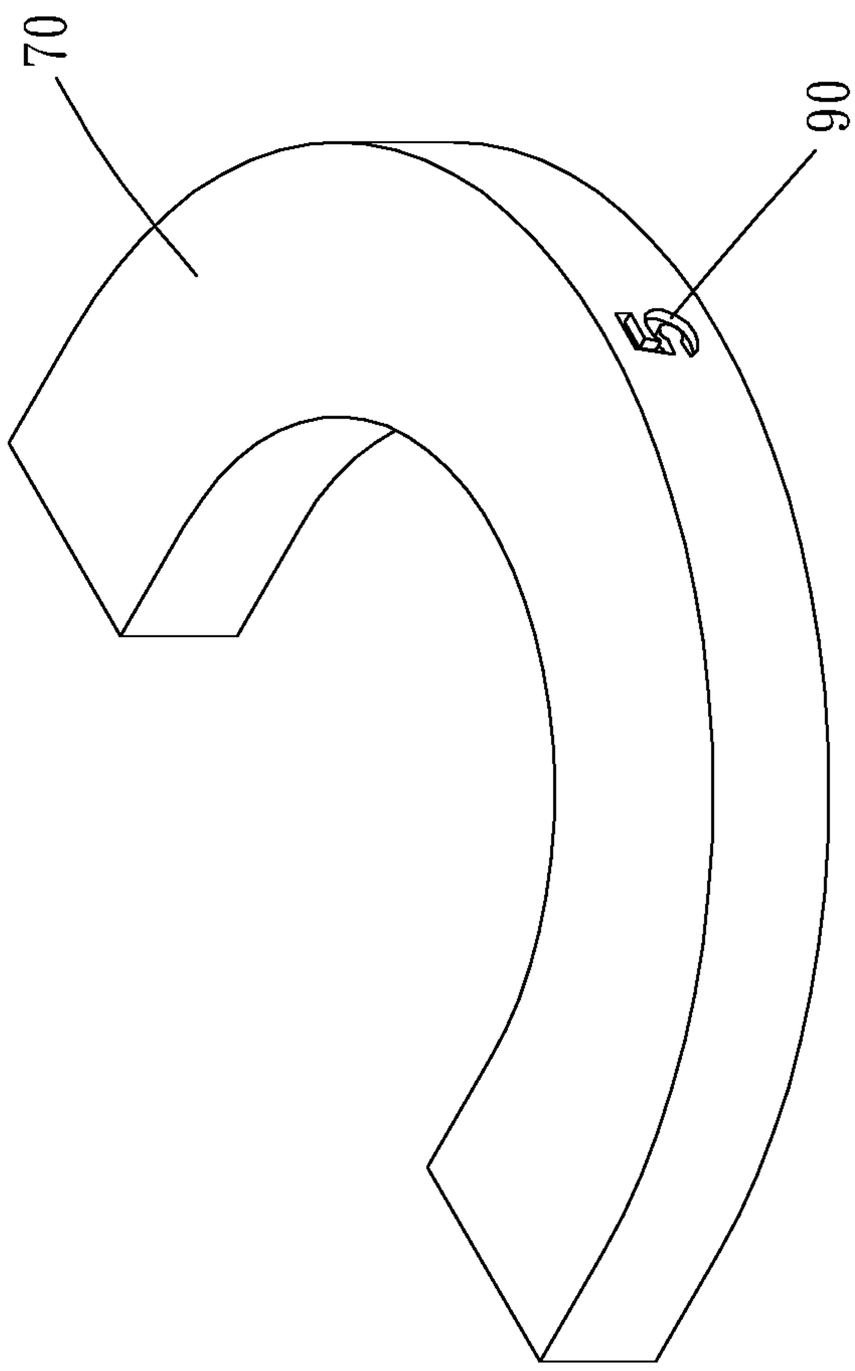


FIG. 5

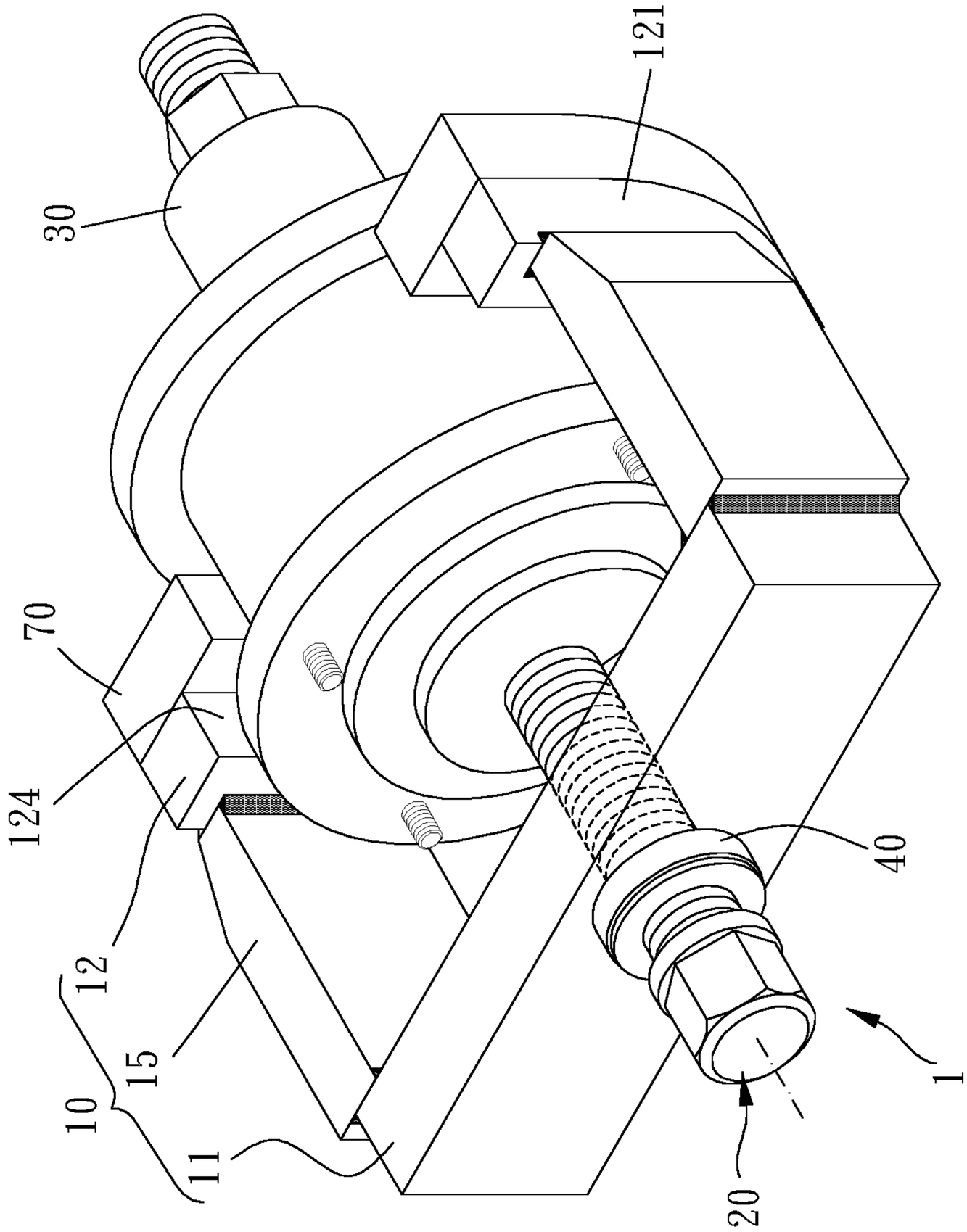


FIG. 6

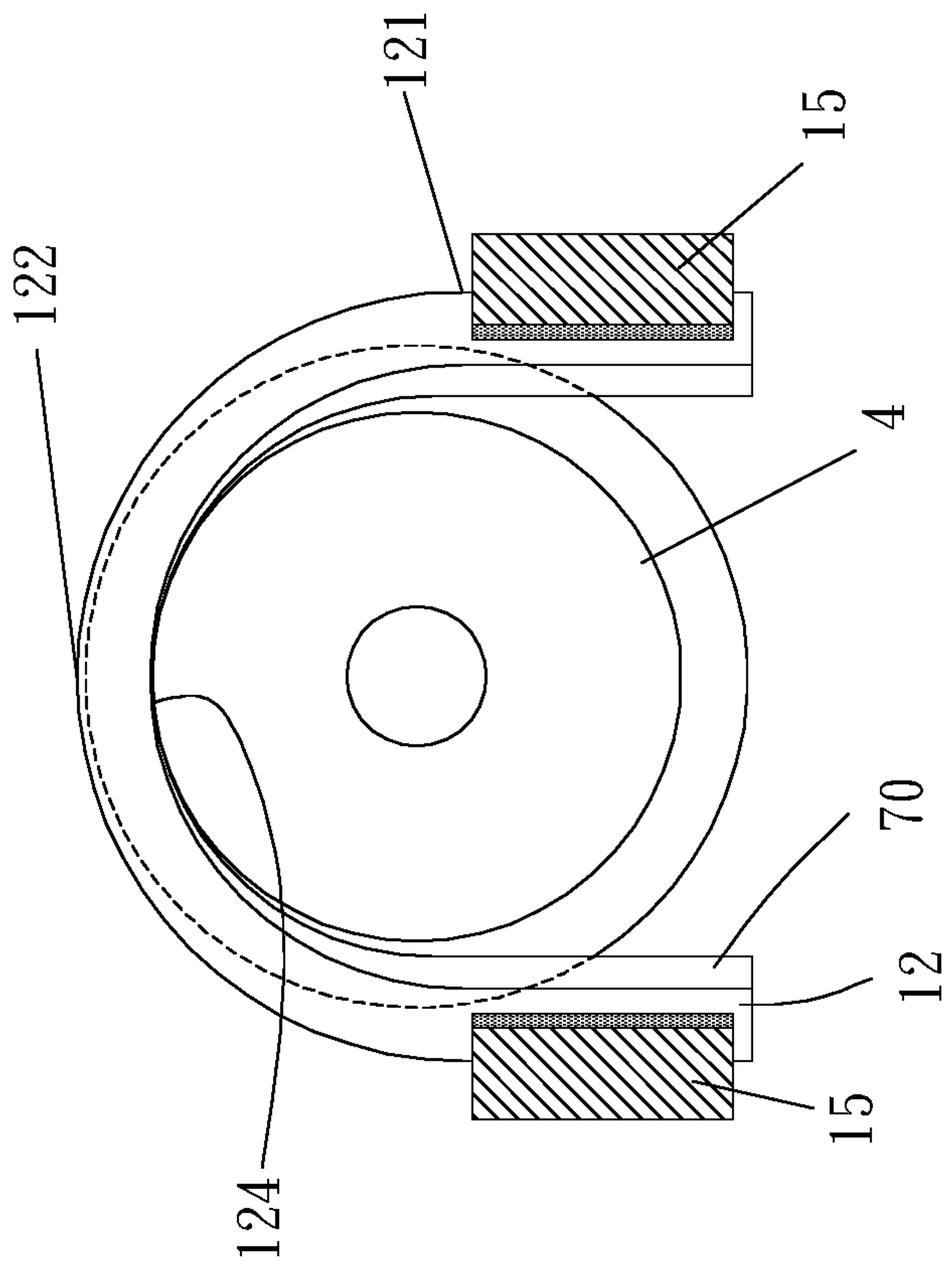


FIG. 7

DISASSEMBLING TOOL

BACKGROUND OF THE INVENTION

Field of the Invention

The present invention relates to a disassembling tool.

Description of the Prior Art

Generally, wheel hubs of a vehicle are worn down due to long-term use or abrasion by dust, gravel or other objects. Therefore, regular replacement of the wheel hubs is required for driving safety.

A conventional disassembling tool for disassembling the wheel hubs includes a shaft and a slide hammer. The shaft includes a first blocking edge and a second blocking edge, and the slide hammer is sleeved to the shaft and located between the first and second blocking edges. During operation, the shaft is penetrated through a wheel hub and the first and second blocking edges are located at two opposite sides of the wheel hub, and the second blocking edge is abutted against the wheel hub. An operator has to repeatedly axially strike the first blocking edge by the slide hammer so that the second blocking edge can push the wheel hub in a direction toward the first blocking edge for disassembling the wheel hub.

However, the second blocking edge of the conventional disassembling tool repeatedly strikes the wheel hub and vibrates relative to the wheel hub, which causes that the second blocking edge cannot stably contact the wheel hub and the disassembling tool is inconvenient to be operated.

The present invention is, therefore, arisen to obviate or at least mitigate the above-mentioned disadvantages.

SUMMARY OF THE INVENTION

The main object of the present invention is to provide a disassembling tool which is convenient for operation and has a bearing with good supportability.

To achieve the above and other objects, the present invention provides a disassembling tool, including: a main body, a screw rod, a screw barrel and a bearing. The main body includes a first end portion, a second end portion opposite to the first end portion and a receiving space disposed between the first end portion and the second end portion. The first end portion includes a through hole, and the second end portion is configured to be abutted against an object to be disassembled. The screw rod penetrates through the through hole and includes a head portion. The screw barrel is screwed on the screw rod, and the screw barrel incudes an assembling portion configured to be assembled with a tool. The bearing is sleeved to the screw rod, and the bearing is disposed between the first end portion and the head portion of the screw rod. The bearing includes an inner ring, an outer ring sleeved on and being rotatable relative to the inner ring, and a plurality of rollers. The inner ring includes a first base board and a first annular portion which are transversely connected with each other, and the outer ring includes a second base board and a second annular portion which are transversely connected with each other. The plurality of rollers are abutted against and between the first and second base boards and between the first and second annular portions. One of the first base board and the second base board faces toward the head portion of the screw rod, and the other of the first base board and the second base board faces toward the first end portion. The second end portion includes an arcuate concave radially disposed thereon and an opening defined by the arcuate concave and being open radially, and the arcuate concave extends around an outer periphery of the screw rod and parts of the arcuate concave are located at two radial opposite sides of the screw rod.

The present invention will become more obvious from the following description when taken in connection with the accompanying drawings, which show, for purpose of illustrations only, the preferred embodiment(s) in accordance with the present invention.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a breakdown drawing of a preferable embodiment of the present invention;

FIG. **2** is a top view of a preferable embodiment of the present invention;

FIGS. **3** and **4** are schematic diagrams of a preferable embodiment of the present invention in use;

FIG. **3**A is a partial enlargement of FIG. **3**;

FIG. **5** is a stereogram of a pad of a preferable embodiment of the present invention;

FIG. **6** is a stereogram of a preferable embodiment of the present invention in use;

FIG. **7** is another schematic diagram of a preferable embodiment of the present invention in use.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Please refer to FIGS. **1** to **4** and FIGS. **6** to **7** for a preferable embodiment of the present invention. A disassembling tool **1** of the present invention includes a main body **10**, a screw rod **20**, a screw barrel **30** and a bearing **40**.

The main body **10** includes a first end portion **11**, a second end portion **12** opposite to the first end portion **11** and a receiving space **13** disposed between the first end portion **11** and the second end portion **12**. The first end portion **11** includes a through hole **14**, and the second end portion **12** is configured to be abutted against an object to be disassembled (such as bearings, gears, axles or the like). The screw rod **20** penetrates through the through hole **14**, and the screw rod **20** includes a head portion **21**. In this embodiment, the head portion **21** is hexagonal and configured to be assembled with a rotatory tool (such as wenches, pneumatic tools, etc.). The screw barrel **30** is screwed on the screw rod **20**, and the screw barrel **30** includes an assembling portion **31** configured to be assembled with a tool (such as wrenches). The bearing **40** is sleeved to the screw rod **20**, and the bearing **40** is disposed between the first end portion **11** and the head portion **21** of the screw rod **20**. The bearing **40** includes an inner ring **41**, an outer ring **42** sleeved on and being rotatable relative to the inner ring **41**, and a plurality of rollers **43**. The inner ring **41** includes a first base board **44** and a first annular portion **45** which are transversely connected with each other, and the outer ring **42** includes a second base board **46** and a second annular portion **47** which are transversely connected with each other. The plurality of rollers **43** are abutted against and between the first and second base boards **44**, **46** and between the first and second annular portions **45**, **47**. One of the first base board **44** and the second base board **46** faces toward the head portion **21** of the screw rod **20**, and the other of the first base board **44** and the second base board **46** faces toward the first end portion **11**. Therefore, the disassembling tool **1** is convenient for operation and the bearing **40** provides the first end

portion **11** and the head portion **21** with good supportability. In operation, each of the head portion **21** of the screw rod **20** and the first end portion **11** is directly or indirectly abutted against one of the first base board **44** and the second base board **46** located at two opposite sides of the bearing **40** so that the screw rod **20** is smoothly rotatable relative to the first end portion **11** without abrasion. In other embodiments, at least one spacer or at least one nut may be disposed between the head portion of the screw rod and the bearing, and at least one spacer or at least one nut may be disposed between the first end portion and the bearing.

In this embodiment, the first end portion **11** is a cuboid which is not easy to deform. In other embodiments, the first end portion may be a sheet, rod, plate, or the like.

The main body **10** further includes at least one arm portion **15**, and each of the at least one arm portion **15** is connected between the first end portion **11** and the second end portion **12**. In this embodiment, the main body **10** includes two arm portions **15**, and each of the two arm portions **15** has a first connecting surface **151** connected with the first end portion **11** and a second connecting surface **152** connected with the second end portion **12**; a dimension of the first connecting surface **151** is larger than a dimension of the second connecting surface **152** so that the main body **10** has good structural strength and the first end portion **11** and the second end portion **12** are preferably connected with the two arm portions **15**. Preferably, each of the two arm portions **15** is connected with the first end portion **11** and the second end portion **12** in a first direction. An outmost connecting point of a respective one of the two arm portions **15** and the second end portion **12** is located between an imaginary line L passing through an outmost connecting point of respective one of the two arm portions **15** and the first end portion **11** and the screw rod **20**, and the imaginary line L is parallel with the first direction, which increases structural strength and avoids swinging of each of the two arm portions **15** relative to the first end portion **11**. The second end portion **12** includes an arcuate concave **124** radially disposed thereon and an opening **123** defined by the arcuate concave **124** and being open radially. The arcuate concave **124** extends around an outer periphery of the screw rod **20** and parts of the arcuate concave **124** are located at two radial opposite sides of the screw rod **20**.

The second end portion **12** is a horseshoe ring and can be rapidly and directly assembled with the object to be disassembled. The horseshoe ring includes two arm segments **121**, a connecting segment **122** connected between the two arm segments **121** and the opening **123**, and the first end portion **11** is transversely connected with the two arm segments **121** for stable operation and being convenient for application of force to disassemble the object. Each of the two arm portions **15** is connected with one of the two arm segments **121**. The opening **123** defines an opening direction, and in the opening direction, each of the two arm portions **15** and an end surface of one of the two arm segments **121** are offset from each other for stable operation without rock. The arcuate concave **124** is disposed on the connecting segment **122**.

The first end portion **11** and respective one of the two arm portions **15**, at two opposite corners disposed therebetween, are connected with each other by first soldering portions **50**; the second end portion **12** and respective one of the two arm portions **15**, at two opposite corners disposed therebetween, are connected with each other by second soldering portions **60** so as to increase connection strength.

The disassembling tool **1** further includes at least one pad **70**, and the at least one pad **70** is disposed between the second end portion **12** and the screw barrel **30**. In this embodiment, each of the at least one pad **70** is a U-ring, and the at least one pad may be a C-ring, plate, or the like. Moreover, the at least one pad **70** is disposed between the second end portion **12** and the object to be disassembled, for stable position and support. The disassembling tool **1** further includes an annular block **80**. The annular block **80** includes a small diameter tubular segment **81** and a large diameter tubular segment **82**, and the annular block **80** is sleeved on the screw rod **20** and located between the first end portion **11** and the screw barrel **30**. The small diameter tubular segment **81** is configured to be abutted against the object to be disassembled (such as a bearing).

As viewed in a radial direction of the bearing **40**, the outer ring **42** is inverted-U shape, the inner ring **41** is convex shaped, and the first annular portion **45** does not protrude axially beyond an end of the second base board **46** away from the plurality of rollers **43**, which prevents the first annular portion **45** from being axially abutted against one of the first end portion **11** and the head portion **21** of the screw rod **20** and from resulting in additional friction when the inner ring **41** and the outer ring **42** are rotated relative to each other. The inner ring **41** further includes a first guiding surface **411** connected between an outer wall of the first annular portion **45** and the first base board **44**, and the outer ring **42** further includes a second guiding surface **421** connected between an inner wall of the second annular portion **47** and the second base board **46**. The plurality of rollers **43** are abutted against and between the first guiding surface **411** and the second guiding surface **421** so as to good support in an axial direction.

A first stepped portion **412** is disposed between the first guiding surface **411** and the first base board **44** and a height difference **413** is formed between the first guiding surface **411** and the first base board **44**. A length of the second annular portion **47** extending axially from the second base board **46** is defined as a first height H**1**, and a sum of the height difference **413** and the first height H**1** is larger than a radius of at least one of the plurality of rollers **43**, which prevents end surfaces of the first base board **44** and the second annular portion **47** from contacting each other and from producing additional friction between the inner ring **41** and the outer ring **42**.

The plurality of rollers **43** are balls, and the first guiding surface **411** and the second guiding surface **421** are arcuate guiding surfaces. Radiuses of curvature of the first guiding surface **411** and the second guiding surface **421** are respectively larger than the radius of at least one of the plurality of rollers **43** so that the plurality of rollers **43** are smoothly rotatable between the first guiding surface **411** and the second guiding surface **421**. Preferably, the radiuses of curvature of the first guiding surface **411** and the second guiding surface **421** are the same, and a ratio of the radius of at least one of the plurality of rollers **43** to a radius of curvatures of the first guiding surface **411** is between 2.5:2.6 and 2.5:2.9. In this embodiment, the ratio is 2.5:2.75 so that the inner ring **41** and the outer ring **42** are axially and radially movable relative to each other without contacting each other, which tolerates manufacturing tolerances of the inner ring **41**, the plurality of rollers **43** and the outer ring **42** in assembling.

Please refer to FIG. **5**, an outer side of at least one of the main body **10**, the screw barrel **30**, the annular block **80** and the pad **70** has a labeling portion **90** for easy recognition. In this embodiment, the labeling portion **90** is engraved (such as by laser engraving) on at least one of the components described above and is not easy to peel off. In other

embodiments, the labeling portion may be printed on at least one of the components described above.

In this embodiment, the object to be disassembled may be a wheel hub assembly **2**. In operation, the second end portion **12** is abutted against a bearing housing **3** of the wheel hub assembly **2**, and a part of the bearing housing **3** is located within the receiving space **13**. The screw barrel **30** is fixed by the tool, and the rotatory tool is assembled to the head portion **21** of the screw rod **20** to rotate the screw rod **20** so that the screw barrel **30** is moved in a direction toward the head portion **21** until the screw barrel **30** is abutted against a wheel hub **4** of the wheel hub assembly **2**, and then the head portion **21** and the screw barrel **30** are moved in opposite directions for disassembling the wheel hub **4**.

Although particular embodiments of the invention have been described in detail for purposes of illustration, various modifications and enhancements may be made without departing from the spirit and scope of the invention. Accordingly, the invention is not to be limited except as by the appended claims.

What is claimed is:

1. A disassembling tool, including:

a main body, including a first end portion, a second end portion opposite to the first end portion and a receiving space disposed between the first end portion and the second end portion, the first end portion including a through hole, the second end portion being configured to be abutted against an object to be disassembled;

a screw rod, penetrating through the through hole, the screw rod including a head portion;

a screw barrel, screwed on the screw rod, the screw barrel including an assembling portion configured to be assembled with a tool;

a bearing, being sleeved to the screw rod, the bearing being disposed between the first end portion and the head portion of the screw rod, the bearing including an inner ring, an outer ring sleeved on and being rotatable relative to the inner ring, and a plurality of rollers, the inner ring including a first base board and a first annular portion which are transversely connected with each other, the outer ring including a second base board and a second annular portion which are transversely connected with each other, the plurality of rollers being abutted against and between the first and second base boards and between the first and second annular portions, one of the first base board and the second base board facing toward the head portion of the screw rod, and the other of the first base board and the second base board facing toward the first end portion;

wherein the second end portion includes an arcuate concave radially disposed thereon and an opening defined by the arcuate concave and being open radially, and the arcuate concave extends around an outer periphery of the screw rod and parts of the arcuate concave are located at two radial opposite sides of the screw rod;

wherein the main body further includes at least one arm portion, and each of the at least one arm portion is connected between the first end portion and the second end portion;

wherein each of the at least one arm portion has a first connecting surface connected with the first end portion and a second connecting surface connected with the second end portion, and a dimension of the first connecting surface is larger than a dimension of the second connecting surface.

2. The disassembling tool of claim **1**, wherein each of the at least one arm portion is connected with the first end portion and the second end portion in a first direction, an outmost connecting point of a respective one of the at least one arm portion and the second end portion is located between an imaginary line passing through an outmost connecting point of a respective one of the at least one arm portion and the first end portion and the screw rod, and the imaginary line is parallel with the first direction.

3. A disassembling tool, including:

a main body, including a first end portion, a second end portion opposite to the first end portion and a receiving space disposed between the first end portion and the second end portion, the first end portion including a through hole, the second end portion being configured to be abutted against an object to be disassembled;

a screw rod, penetrating through the through hole, the screw rod including a head portion;

a screw barrel, screwed on the screw rod, the screw barrel including an assembling portion configured to be assembled with a tool;

a bearing, being sleeved to the screw rod, the bearing being disposed between the first end portion and the head portion of the screw rod, the bearing including an inner ring, an outer ring sleeved on and being rotatable relative to the inner ring, and a plurality of rollers, the inner ring including a first base board and a first annular portion which are transversely connected with each other, the outer ring including a second base board and a second annular portion which are transversely connected with each other, the plurality of rollers being abutted against and between the first and second base boards and between the first and second annular portions, one of the first base board and the second base board facing toward the head portion of the screw rod, and the other of the first base board and the second base board facing toward the first end portion;

wherein the second end portion includes an arcuate concave radially disposed thereon and an opening defined by the arcuate concave and being open radially, and the arcuate concave extends around an outer periphery of the screw rod and parts of the arcuate concave are located at two radial opposite sides of the screw rod;

wherein the second end portion is a horseshoe ring, the horseshoe ring includes two arm segments, a connecting segment connected between the two arm segments and the opening, the first end portion is transversely connected with the two arm segments, and the arcuate concave is disposed on the connecting segment.

4. The disassembling tool of claim **3**, wherein the main body further includes two arm portions, each of the two arm portions is connected with one of the two arm segments, the opening defines an opening direction, and in the opening direction, each of the two arm portions and an end surface of one of the two arm segments are offset from each other.

5. The disassembling tool of claim **1**, wherein the inner ring further includes a first guiding surface connected between an outer wall of the first annular portion and the first base board, the outer ring further includes a second guiding surface connected between an inner wall of the second annular portion and the second base board, and the plurality of rollers are abutted against and between the first guiding surface and the second guiding surface.

6. A disassembling tool, including:

a main body, including a first end portion, a second end portion opposite to the first end portion and a receiving space disposed between the first end portion and the second end portion, the first end portion including a

through hole, the second end portion being configured to be abutted against an object to be disassembled;

a screw rod, penetrating through the through hole, the screw rod including a head portion;

a screw barrel, screwed on the screw rod, the screw barrel including an assembling portion configured to be assembled with a tool;

a bearing, being sleeved to the screw rod, the bearing being disposed between the first end portion and the head portion of the screw rod, the bearing including an inner ring, an outer ring sleeved on and being rotatable relative to the inner ring, and a plurality of rollers, the inner ring including a first base board and a first annular portion which are transversely connected with each other, the outer ring including a second base board and a second annular portion which are transversely connected with each other, the plurality of rollers being abutted against and between the first and second base boards and between the first and second annular portions, one of the first base board and the second base board facing toward the head portion of the screw rod, and the other of the first base board and the second base board facing toward the first end portion;

wherein the second end portion includes an arcuate concave radially disposed thereon and an opening defined by the arcuate concave and being open radially, and the arcuate concave extends around an outer periphery of the screw rod and parts of the arcuate concave are located at two radial opposite sides of the screw rod;

wherein the inner ring further includes a first guiding surface connected between an outer wall of the first annular portion and the first base board, the outer ring further includes a second guiding surface connected between an inner wall of the second annular portion and the second base board, and the plurality of rollers are abutted against and between the first guiding surface and the second guiding surface;

wherein a first stepped portion is disposed between the first guiding surface and the first base board and a height difference is formed between the first guiding surface and the first base board, a length of the second annular portion extending axially from the second base board is defined as a first height, and a sum of the height difference and the first height is larger than a radius of at least one of the plurality of rollers.

7. The disassembling tool of claim **5**, wherein the plurality of rollers are balls, the first guiding surface and the second guiding surface are arcuate guiding surfaces; radiuses of curvature of the first guiding surface and the second guiding surface are respectively larger than a radius of at least one of the plurality of rollers.

8. The disassembling tool of claim **4**, wherein the first end portion is a cuboid; each of the two arm portions is connected between the first end portion and the second end portion; each of two arm portions includes a first connecting surface connected with the first end portion and a second connecting surface connected with the second end portion, a dimension of the first connecting surface is larger than a dimension of the second connecting surface; each of the two arm portions is connected with the first end portion and the second end portion in a first direction, an outmost connecting point of a respective one of the two arm portions and the second end portion is located between an imaginary line passing through an outmost connecting point of a respective one of the two arm portions and the first end portion and the screw rod, the imaginary line is parallel with the first direction; the inner ring further includes a first guiding surface connected between an outer wall of the first annular portion and the first base board, the outer ring further includes a second guiding surface connected between an inner wall of the second annular portion and the second base board, the plurality of rollers are abutted against and between the first guiding surface and the second guiding surface; a first stepped portion is disposed between the first guiding surface and the first base board and a height difference is formed between the first guiding surface and the first base board, a length of the second annular portion extending axially from the second base board defines a first height, a sum of the height difference and the first height is larger than a radius of at least one of the plurality of rollers; the plurality of rollers are balls, the first guiding surface and the second guiding surface are arcuate guiding surfaces; radiuses of curvatures of the first guiding surface and the second guiding surface are respectively larger than a radius of at least one of the plurality of rollers; the radiuses of curvature of the first guiding surface and the second guiding surface are the same, a ratio of the radius of at least one of the plurality of rollers to a radius of curvatures of the first guiding surface is between 2.5:2.6 and 2.5:2.9; as viewed in a radial direction of the bearing, the outer ring is inverted-U shaped, the inner ring is convex shaped, the first annular portion does not protrude axially beyond an end of the second base board away from the plurality of rollers; the first end portion and respective one of the two arm portions, at two opposite corners disposed therebetween, are connected with each other by first soldering portions; the second end portion and respective one of the two arm portions, at two opposite corners disposed therebetween, are connected with each other by second soldering portions; the disassembling tool further includes at least one pad, the at least one pad is disposed between the second end portion and the screw barrel; the disassembling tool further includes an annular block, the annular block includes a small diameter tubular segment and a large diameter tubular segment, the annular block is sleeved on the screw rod and located between the first end portion and the screw barrel; an outer side of at least one of the main body, the screw barrel, the annular block and the pad has a labeling portion.

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